UNITED STATES PATENT AND TRADEMARK OFFICE

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ART UNIT	PAPER NUMBER
2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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	Application No.	Applicant(s)
	10/807,949	ZHANG, TONG
Office Action Summary	Examiner	Art Unit	
	THOMAS M. REDDING	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 March 2008*.
2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1-22* is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☐ All   b)☐ Some * c)☐ None of:
        1.☐ Certified copies of the priority documents have been received.
        2.☐ Certified copies of the priority documents have been received in Application No. _____.
        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)
1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5)☐ Notice of Informal Patent Application
6)☐ Other: _____.

DETAILED ACTION

Response to Amendment

Applicant's response received on 3/4/2008 is fully considered herein. Claims 1-

22 are currently pending.

Claim Rejections - 35 USC § 102

1.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2.   Claims 1, 11, 14 and 16 are rejected under 35 U.S.C. 102(e) as being anticipated

by Gong et al. (US 7,016,540).

Regarding claims 1 and 14, Gong discloses [a] key-frame extraction system

("The invention also seeks to fulfill different user requirements for video browsing and

content overview by outputting either an optimal set of keyframes representing the input

video sequence", Gong, column 5, line 47), comprising a set of frame analyzers that

each select a set of candidate key-frames from among a series of video frames in a

video, each frame analyzer for detecting a meaningful content in the video("Performing

subsequent singular value decomposition on this matrix A projects each frame i from

the m-dimensional raw feature space into a K-dimensional refined feature space

(usually K<<m, though this is not required). In this new feature space, noise and trivial

variations in video frames are ignored, and frames with similar color distribution patterns

are mapped near to each other", Gong, column 6, line 1) such that the candidate key-

frames comprise a subset of the video frames in the video ("Other aspects of the

inventive method include arranging the selected frames into a feature frame matrix, and

performing the singular value decomposition on this feature frame matrix", Gong,

column 5, line 7);

key-frame selector that arranges the candidate key-frames into a set of clusters

("Therefore, the K-dimensional vectors representing each of the frames in the refined

feature space can be used not only for clustering visually similar frames for content

summarization, but also for accurately segmenting video frames into shots, and also for

similarity matching among the detected shots", Gong, column 6, line 8).

Regarding claim 11 and 16, Gong The key-frame extraction system of claim 14,

wherein the frame analyzers include a color histogram analyzer ("The video frames of

the input video sequence are represented in the method according to an embodiment of

the present invention using color histograms", Gong, column 6, line 55).

Claim Rejections - 35 USC § 103

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

4.   Claims 2, 4, 5, 7-10, 18, 19 and 21 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Gong et al. (US 7,016,540) in combination with Li et al. (US

2003/0210886).

Regarding claims 2 and 19, Gong discloses [t]he key-frame extraction system of

claim 14.

Gong does not disclose wherein the frame analyzers include a camera motion

tracker.

Li working in the same field of endeavor of key-frame extraction wherein the

frame analyzers include a camera motion tracker ("Camera motion may be detected by

analyzing the layout pattern of the extracted motion vectors mv", Li, Paragraph 42 and

figure 3).

It would have been obvious at the time the invention was made for one of

ordinary skill in the art to include the camera motion tracker of Li in the key-frame

extraction system of Gong because "when the underlying video content of a scene 22 is

highly dynamic (usually characterized by lots of camera motion, many object activities

and a large number of contained shots), the scene 22 has complex contents, and thus

deserves more keyframes" (Li, column 33).

Regarding claims 4 and 18, Gong teaches [t]he method of claim 1.

Gong does not teach wherein selecting a set of candidate key-frames includes

selecting a set of candidate key-frames in response to a fast camera movement in the

video.

Li, working in the same field of endeavor of key-frame extraction does teach

wherein selecting a set of candidate key-frames includes selecting a set of candidate

key-frames in response to a fast camera movement in the video ("The last two factors

are used to make sure that the extracted keyframe is a well-focused clear image and

not a blurry image, such as is caused by a fast camera motion, fast object movement or

a bad camera focus. For example, the still image taken after a camera panning is

preferred over the image taken during the panning which may be blurred or unstable", Li

paragraph 52).

It would have been obvious at the time the invention was made for one of ordinary skill in the art to use the fast motion detection teachings of Li in the key-frame extraction system of Gong since fast camera motion causes blurring and it is better to avoid those frames and to use frames outside a sequence of fast camera motion.

Regarding claims 5 and 21, Gong discloses [t]he key-frame extraction system of claim 14.

Gong does not disclose wherein the frame analyzers include a human face detector.

Li does teach wherein the frame analyzers include a human face detector ("Four factors are considered in determining the importance of a frame 26 according to one embodiment of the invention: 1) ...; 2) the number of detected human faces in the frame ...", Li, paragraph 52).

It would have been obvious at the time the invention was made for one of ordinary skill in the art to use the face detector frame analyzer as taught by Li in the key-frame extraction system of Gong help judge the importance of a frame as "generally speaking, a frame 26 that contains a human face will be more informative than, for example, a landscape frame", Li, paragraph 52).

Regarding claim 7, Gong teaches [t]he method of claim 1.

Gong does not teach wherein selecting one of the key-frames from each cluster includes determining an importance score for each candidate key-frame.

Li does disclose wherein selecting one of the key-frames from each cluster includes determining an importance score for each candidate key-frame ("an importance value is assigned to each scene, shot and frame", Li, paragraph 8).

It would have been obvious at the time the invention was made for one of ordinary skill in the art to use the importance score of Li in frame analysis of the key-frame extraction system of Gong as "different shots may be of different importance to users, it is preferably to assign more keyframes to important shots than to the less important ones" (Li, paragraph 6).

Regarding claim 8, Gong discloses [t]he method of claim 7.

Gong does not disclose wherein determining an importance score for each candidate key-frame includes determining an importance score in response to the meaningful content in each candidate key-frame.

Li does teach wherein determining an importance score for each candidate key-frame includes determining an importance score in response to the meaningful content

in each candidate key-frame ("FIG. 1c is a flowchart illustrating one embodiment of the computation of importance values according to the invention", Li, paragraph 11, and figure 1c).

It would have been obvious at the time the invention was made for one of ordinary skill in the art to use the importance score of Li in frame analysis of the key-frame extraction system of Gong as "different shots may be of different importance to users, it is preferably to assign more keyframes to important shots than to the less important ones" (Li, paragraph 6).

Regarding claim 9, Gong teaches [t]he method of claim 1.

Gong does not teach wherein selecting one of the key-frames from each cluster includes selecting one of the key-frames in response to an image quality of each candidate key-frame.

Li does teach wherein selecting one of the key-frames from each cluster includes selecting one of the key-frames in response to an image quality of each candidate key-frame ("The last two factors are used to make sure that the extracted keyframe is a well-focused clear image and not a blurry image", Li, paragraph 52).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to use image quality as a means of selecting key-frames as taught by Li in the key-frame extraction system of Gong since blurry or out-of-focus images will be less aesthetically appealing to a viewer.

Regarding claim 10, Gong teaches [t]he method of claim 1.

Gong does not teach further comprising selecting multiple key-frames from each cluster and obtaining a user selection for the multiple key- frames.

Li does teach further comprising selecting multiple key-frames from each cluster and obtaining a user selection for the multiple key- frames ("if the user wants a detailed summary of certain scenes 22 or shots 24 while only wanting a brief review of others, the invention as described herein can easily achieve this by using a predefined but tunable scale factor", Li paragraph 73, the system selects an initial key-frame set and the user can control how many to select based on a tunable scaling factor).

It would have been obvious at the time the invention was made for one of ordinary skill in the art to include the user interaction taught by Li in the key-frame extraction system of Gong since "sometimes the user may want to take a detailed look at certain scenes or shots which requires more keyframes, and sometimes the user may

only need a very coarse summarization which requires fewer keyframes" (Li, paragraph

6).

5.   Claims 3, 6, 13, 15, 20 and 22 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Gong et al. (US 7,016,540) in combination with Chang et al (US

2004/0125877).

Regarding claims 3 and 20, Gong discloses all the elements of claims 1 and 14

above. Gong does not explicitly teach selecting a set of candidate key-frames in

response to an object motion in the video.

Chang, working in the same field of endeavor of video analysis, does teach

selecting a set of candidate key-frames in response to an object motion in the video ("a

Visual Feature Extraction Module 340 extracts visual features that can be used for view

recognition or event detection. Examples of visual features include camera motions,

object motions, color, edge, etc.", Chang, paragraph 104).

It would have been obvious at the time the invention was made for one of

ordinary skill in the art to add the object motion detection feature of Chang to the video

analysis system of Gong in order to aid in detecting scene changes, "Since there are

many different changes in video (e.g. object motion, lighting change and camera motion), it is a nontrivial task to detect scene changes", (Chang, paragraph 77).

Regarding claims 6 and 15, Gong does not disclose an audio event detector that selects a set of candidate key-frames by detecting a set of audio events in the video.

Chang, working in the same field of endeavor of video analysis, does teach an audio event detector that selects a set of candidate key-frames by detecting a set of audio events in the video ("An Audio Feature Extraction module 345 extracts audio features that are used in later stages such as event detection", Chang, paragraph 105).

It would have been obvious at the time the invention was made for one of ordinary skill in the art to add the Audio Feature Extraction Module feature of Chang to the video analysis system of Gong in order to aid in detecting scene changes that have characteristic sound events associated with them ("more detailed analysis of motion such as speed, direction, repeating patterns in combination with audio analysis (e.g., hitting sound) may be needed.", Chang, paragraph 185).

Regarding claims 13 and 22, Gong does not disclose a user interface for displaying a set of video frames in the video previous to each key-frame and a set of video frames in the video subsequent to each key-frame and for obtaining a user selection of one or more of the video frames.

Chang, working in the same field of endeavor of video analysis, does teach a user

interface for displaying a set of video frames in the video previous to each key-frame

and a set of video frames in the video subsequent to each key-frame and for obtaining a

user selection of one or more of the video frames ("there may be false alarms or misses

associated with the indexing process. A browsing interface may be used for users to

identify and correct false alarms. For errors of missing correct scene changes, users

may use the interactive interface during real-time playback of video to add scene

changes to the results", Chang, paragraph 100).

It would have been obvious at the time the invention was made for one of

ordinary skill in the art to add an interactive interface as taught by Chang to the video

analysis system of Gong so "If a user is monitoring the scene change detection process

and notices a miss or false detection, he or she can hit a key or click mouse to insert or

remove a scene change in real time." (Chang, paragraph 99).

6.   Claims 12 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Gong et al. (US 7,016,540) in combination with Dufaux (US 6,711,587 B1).

Regarding claims 12 and 17, Gong discloses all the elements of claims 1 and 14.

Gong does not teach wherein the frame analyzers include a color layout analyzer.

Dufaux, working in the same field of endeavor of keyframe selection does teach wherein the frame analyzers include a color layout analyzer ("Returning to FIG. 5, at step 502 a pixel-wise frame difference number is calculated for each frame. A measure of the amount of difference between pixels in successive frames may be used to determine a shot boundary in the digital video file", Dufaux, column 8, line 37, Dufaux's method computes color differences at specific x,y locations corresponding to a physical layout of the features).

It would have been obvious at the time the invention was made for one of ordinary skill in the art to use the frame difference method of Dufaux with the video analysis system of Gong to provide another method to test for shot boundaries since "A high value of pixel-wise frame difference indicates a possible shot boundary" (Dufaux, column 8, line 47).

Response to Arguments

7.   Applicant's arguments with respect to claims 1-22 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

8.   Applicant's amendment necessitated the new ground(s) of rejection presented in

this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37

CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later

than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to THOMAS M. REDDING whose telephone number is

(571)270-1579. The examiner can normally be reached on Mon - Fri 7:30 am - 5:00 pm

EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Vikkram Bali can be reached on (571) 272-7415. The fax phone number for

the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

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/T. M. R./
Examiner, Art Unit 2624

/Vikkram Bali/

Supervisory Patent Examiner, Art Unit 2624